

Applicant : Claire Hartmann-Thompson
Appln. No. : 10/694,027
Page : 3

REMARKS

Applicant acknowledges that claims 11-20 have been withdrawn from consideration based on a mistaken belief that there is “no allowable generic or linking claim.” Accordingly, upon reconsideration and recognition of the allowable subject matter, it is believed that claims 11-20 will be considered for rejoinder in the application.

Claims 1-10 remain pending and under consideration in the application.

Prior Art Rejection

Claims 1-10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over McGill et al. (U.S. 2002/009603) in view of Zheng et al. “X-ray Characterizations of Polyethylene Polyhedral Oligomeric Silsesquioxane Copolymers,” *Macromolecules*, 2002, 35, 2375-2379.

According to the rejection, McGill et al. teach linear chemoselective carbosilane polymers which comprise a polymer matrix containing functional groups that interact preferentially with target analytes through dipole-dipole interactions, van der Waals force, or hydrogen bonding. It is admitted that “McGill does not teach a solid particulate filler dispersed in the polymer matrix.”

According to the rejection, Zheng et al. teach the use of polyhedral oligomeric silsesquioxane (POSS) nanoparticles polymerized with ethylene to create a new stable polymer. It is incorrectly stated that the copolymers are polysiloxanes. This is entirely untrue because Zheng et al. make it clear that the POSS units are pendant to the polyethylene chains as shown in FIG. 2 of the reference. See the Abstract and page 2376, left column, lines 11-15 of the last full paragraph. It is agreed that the Zheng et al. reference states that the polyethylene-co-POSS copolymers “have higher mechanical and thermal properties than the polymers without POSS side units.” See page 2375, left column, first sentence of the second paragraph under the “Introduction” subtitle.

It was concluded in the Office Action that a person of ordinary skill in the art would have found it obvious at the time the invention was made “to modify McGill to employ POSS as the particulate filler to increase the mechanical and thermal properties of the polymer matrix.”

Applicant : Claire Hartmann-Thompson
Appln. No. : 10/694,027
Page : 4

Initially, it should be noted that the Examiner's conclusion infers that McGill et al. disclose a particulate filler and that it would be obvious to use POSS as the particulate filler of McGill et al. This reasoning is clearly contrary to the Examiner's own statement that "McGill does not teach a solid particulate filler dispersed in the polymer matrix."

The Examiner appears to be suggesting that the "higher mechanical and thermal properties" of the polyethylene-co-POSS copolymers would cause the person of ordinary skill in the art to expect that the addition of either the copolymers or POSS of Zheng et al. to the linear chemoselective carbosilane polymers of McGill et al. would desirably improve the physical properties of the polymer films used by McGill et al. in sensor devices. It is not clear whether the Examiner means that it is obvious to add the POSS, the copolymer or both POSS and copolymer of Zheng et al. to the McGill et al. polymer.

If one takes the rejection at face value and assumes, as is literally stated by the Examiner, that the rejection is based on it having been obvious to add POSS, not the polyethylene-co-POSS copolymer, to the McGill et al. chemoselective carbosilane polymer, then the rejection is not supported by the prior art. Zheng et al. suggest that the increase in mechanical and thermal properties is achieved due to crystallization of POSS units that are attached as side groups to the polymer chains. There is no reason to believe that the addition of POSS as a filler to a polyethylene matrix would achieve a similar result, and there is no reason to believe that such result would be achieved by adding POSS to the linear chemoselective carbosilane polymer of McGill et al. In fact, Zheng et al. expressly state (see the sentence bridging pages 2375 and 2376) that "reinforcement of a copolymer by aggregates of POSS should be distinguished from any reinforcement caused simply by the bulky nature of individual POSS nanoparticles in cases where the POSS units do not crystallize."

However, if the rejection is interpreted to mean that it would have been obvious to add the polyethylene-co-POSS copolymer of Zheng et al. to the McGill et al. linear chemoselective carbosilane polymer, the resulting composition would be a polymer/copolymer blend, not a composite comprising a filler dispersed in a polymer matrix, as claimed.

Applicant : Claire Hartmann-Thompson
Appln. No. : 10/694,027
Page : 5

Finally, there is no way to interpret the rejection so as to achieve the claimed invention. Neither reference teaches nor suggests a sensory group functionalized particulate filler dispersed in a polymer matrix. As admitted by the Examiner, "McGill does not teach a solid particulate filler dispersed in the polymer matrix." Similarly, Zheng et al. do not disclose a solid particulate filler dispersed in a polymer matrix. Nor do either of the references disclose sensory functionalized POSS particles, as required by the claims.

McGill et al. do not suggest any need to increase the mechanical and/or thermal properties of the disclosed linear chemoselective carbosilane polymer films of their sensor devices, and therefore do not provide any genuine reason to incorporate the POSS and/or polyethylene-co-POSS copolymers of Zheng et al. McGill et al. actually teach against such addition. In particular, McGill et al. teach that chemoselective polycarbosilane polymer films desirably have a high density of functional groups per unit mass (see paragraphs 7, 11, 36 and 60), and that chemoselective polymers used on chemical sensor devices should not be crystalline or glassy at room temperature (see paragraphs 7 and 12). Thus, McGill et al. teach two very important things that would have led a person of ordinary skill in the art away from the claimed invention. First, McGill et al. teach that it would not be desirable to add the POSS or polyethylene-POSS copolymer of Zheng et al. to the McGill et al. linear chemoselective carbosilane polymer films because they would dilute the functional group density and thus reduce the sensitivity of the sensors on which the polymer films are used. Second, McGill et al. teach that it would be undesirable to add the POSS and/or polyethylene-co-POSS copolymers of Zheng et al. to the McGill et al. linear chemoselective carbosilane polymer films because, as taught by Zheng et al. (see the last sentence of the first full paragraph in the right column of page 2378), this modification would be expected to undesirably increase the glass transition temperature of the films thereby slowing response and increasing the recovery time needed between uses.

It is believed that the prior art correctly teaches away from the proposed combination of McGill et al. and Zheng et al., since such combination would almost certainly undesirably reduce sensitivity by reducing the density of the chemoselective functional groups per unit mass of film, and undesirably increase the response time and the recovery time by increasing the glass transition temperature.

Applicant : Claire Hartmann-Thompson
Appln. No. : 10/694,027
Page : 6

Irrespective of the fact that McGill et al. teach against increasing glass transition temperature, while Zheng et al. teach that adding POSS would increase glass transition temperature, the proposed combination simply does not provide the claimed invention or any of the advantages thereof. If the prior art is combined as suggested by the Examiner, the resulting combination does not include sensory group functionalized particulate fillers distributed in a polymer matrix, i.e., the sensory groups are still bonded only to the polymer, not to the particulate filler, as required by the claims.

As noted by the Examiner, the claimed invention achieves improved mechanical properties as compared with conventional sensor materials, including better strength properties and better aging performance (see the last full paragraph at page 10 of the specification). These advantages are achieved without undesirably increasing the glass transition temperature. To the contrary, Applicant describes and claims compositions having a glass transition temperature at or below room temperature.

Further, the improved mechanical and aging properties of the invention are not a primary objective or advantage of the invention. A more important advantage of the invention is that the polymer matrix material may be selected based primarily on its physical properties rather than on its ability to incorporate sensory groups. For example, by utilizing a sensory functionalized filler rather than a sensory functionalized polymer, it is possible to select polymers having a preferred combination of strength, stability and diffusion properties, without regard as to whether appropriate or desired sensory groups can be bonded to the polymer. This is not an advantage of the proposed prior art combination. The preferred POSS particulate filler is capable of being used in relatively high loading concentrations within a polymer matrix, and has a very high density of functional groups per unit mass. The invention makes it possible to achieve high densities of sensory functional groups per unit mass of polymer film without bonding any of the sensory groups to the polymer matrix material thereby achieving high sensitivity, fast response time, and fast recovery, in a simplified manner that does not require consideration of the chemistry needed to attach sensory groups to a polymer.

A further advantage of the invention is that the same polymer can be used with different sensory fillers to provide a device having a diverse sensor array. This further simplifies

Applicant : Claire Hartmann-Thompson
Appln. No. : 10/694,027
Page : 7

manufacturing by allowing the same polymer matrix and application techniques to be employed for all of the different sensors in a sensor array device.

The prior art would not have led the person of ordinary skill in the art to predict that sensory group functionalized particulate fillers could be advantageously employed in a polymer matrix to form improved sensor materials. The rejection fails to address the claimed invention and should be withdrawn.

CONCLUSION

In view of the above amendments and remarks, it is respectfully submitted that the application is in condition for allowance and notice of the same is earnestly solicited.

Respectfully submitted,

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